



PROGRAM SPECIFICATIONS  
FOR:

**Master of Science Degree in Diagnostic and Molecular Microbiology** CODE: 1706700

UNIVERSITY: Alexandria

FACULTY: Medical Research Institute

## PROGRAM SPECIFICATION

### A- BASIC INFORMATION

<b>1- Program Title:</b>	<b>Master of Science in Diagnostic and Molecular Microbiology</b>
<b>2- Program Type:</b>	Single ( <input checked="" type="checkbox"/> ) Double ( <input type="checkbox"/> ) Multiple ( <input type="checkbox"/> )
<b>3- Department(s):</b>	Department of Microbiology
<b>4- Program Coordinator:</b>	Prof. Dr. Abeer Ghazal <b>Prof Fayeka Ghonium</b>
<b>5- External evaluator(s):</b>	<b>Prof of Microbiology, Faculty of Medicine , Alexandria University</b>
<b>Last date of program Specification Approval:</b>	<b>8/1/2017</b>

### B- PROFESSIONAL INFORMATION

#### 1- Program aims:

To provide the students with a framework for understanding the role of microbiology in medicine and provide the knowledge, skills and critical awareness that are essential for contributing to the research and services in the field of Microbiology.

By end of the program, the student should:

1. Acquire and integrate a knowledge base in all areas of Microbiology to enable students to understand the pathogenic processes.
2. Have comprehensive knowledge on fundamentals of medical bacteriology and its relation to human biology and disease through studying the basic properties of microorganisms.
3. Understand the fundamental basis of the virus life style and the ground rules of viral pathogenesis.
4. Have basic knowledge on fundamentals of medical mycology regarding morphology, taxonomy, classification and detection of fungi from clinical specimen.



5. Understand fundamentals of bacterial genetics and the basic knowledge of eukaryotic and prokaryotic genes, nucleic acids, DNA replication, transcription and translation, mechanisms of gene transfer, gene expression and mechanisms of genetic exchange and mutations.
6. Have comprehensive knowledge on molecular laboratory techniques used in isolation, identification of microbial pathogens including methods of DNA and RNA extraction from clinical specimen and different amplification techniques.
7. Gain skills and experience in basic molecular laboratory techniques used in diagnostic medical microbiology including DNA and RNA purification procedure, gel electrophoresis, plasmid preparation, different amplification protocols with both conventional polymerase chain reaction and real time polymerase chain reaction.
8. Have comprehensive knowledge on general considerations for the epidemiology of the infectious agents; the clinically important viral, bacterial and fungal diseases both in community and hospital environments.
9. Understand the insights of principles and practice of infection control and benefit of adhering to scientifically acceptable infection control measures to patients and healthcare workers.
10. Have a comprehensive knowledge on the mode of action of different antimicrobial agents, the susceptibility of organisms and resistance mechanisms to these antimicrobials. The indications for susceptibility tests and technical variations of susceptibility tests applied in clinical laboratories.
11. Have a comprehensive knowledge about normal flora, host parasite relationship, infectious process, virulence determinants and host defense mechanisms.
12. Gain skills in practical microbiological laboratory diagnostic techniques so as to complete the knowledge acquired in Medical Microbiology with practical skills in diagnostic techniques.

## **2- Intended Learning outcomes of the course (ILOs)**

### **a) Knowledge and Understanding:**

- a1. Recall bacterial pathogenesis mechanisms from classical and molecular perspectives and detailed study of specific disease syndromes, integrating different fields of study to make judgments in a professional setting.
- a2. Describe the fundamental basis of the virus life style, the ground rules of viral pathogenesis, covering the different areas: viral structure, replication, viral virulence and persistence, virus cell interactions and oncogenesis, and finally treatment with antiviral drugs together with methods of prevention and control of viral diseases.



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- a3. Recall fungal infection focusing particularly on the practical elements of diagnosis and providing graduates with skills for working and participating in a broad-based mycology service.
- a4. Discuss the fundamentals of bacterial genetics; eukaryotic and prokaryotic genes, nucleic acids, DNA replication, the processes of transcription and translation, gene transfer, gene expression and genetic exchange and mutations.
- a5. List molecular laboratory techniques used in isolation, identification of microbial pathogens including methods of DNA and RNA extraction from clinical specimen and amplification techniques, focusing on recombinant DNA technology, molecular typing, polymerase chain reaction (PCR), real time fluorescent PCR.
- a6. List isolation methods of nucleic acid extraction and amplification and sequencing
- a7. Discuss microbial diseases of public health significance, and methods of investigation.
- a8. List the different signs and symptoms of the microbial diseases of public health significance and investigations applied for them
- a9. Discuss how pathogens may be transmitted and principles to minimize the transmission of disease to patient, visitors, employees of healthcare facilities, and community at large.
- a10. Recall mode of action of different antimicrobial agents and the mechanism of bacterial resistance to these agents, the susceptibility of the organism to appropriate antimicrobial agents, the influence of technical variation on susceptibility test results and the indications for susceptibility tests in the clinical laboratory
- a11. Discuss basic knowledge of host-parasite relationship, infectious process, virulence determinants and host defense mechanisms.
- a12. Define the concepts of microscopic examination, aseptic techniques for the transfer and handling of microorganisms and different types of clinical samples and the principles of immunologic assays for diagnosis of important infectious diseases.
- a13. Discuss current hot topics and important concepts in the field of microbiology.

**b) Intellectual Skills:**

- b1. Examine the causal relationship of bacterial diseases, symptoms and application of microbiological techniques in the diagnosis of infectious diseases.
- b2. Categorize viruses according to standard taxonomy, distinguish pathogenesis, clinical symptoms, signs, investigations, treatment and prognosis of the medically important viruses and formulate and analyze appropriate management plans for different viral infections.
- b3. Distinguish the pathogenic effects of fungi and the use of serological tests in diagnosing fungal infections
- b4. Differentiate between the structures of eukaryotic and prokaryotic genes and different bacterial genetic regulation processes.



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- b5. Compare the different methods of nucleic acid isolation, different methods of gene cloning, conventional & real time PCR
- b6. Distinguish pathogenesis, clinical symptoms, signs, investigations, treatment and prognosis of the medically important emerging pathogens
- b7. Examine the microbial diseases of public health significance in the field of microbiology and ways conducted to combat them.
- b8. Criticize a safe environment for lab personnel, analyze the reason behind contamination or infection problem appeared in the lab, management infection problem depending on the strategies of Infection Control.
- b9. Appraise the different mode of action of antimicrobial agents, select the most appropriate and cost-effective antimicrobial agent leading to control of disease.
- b10. Assess the concept of aseptic handling of specimens and evaluate different immunologic and serologic tests used in the diagnosis of important infectious diseases.
- b11. Analyze emerging health problems in the field of microbiology and ways conducted to combat them

**C-Professional and Practical Skills:**

- c1- Practice working in safe environments and following infection control measures.
- C2-Apply isolation and identification of pathogens by biochemical, serological diagnosis methods (microscope, ELISA) with ability to interpret test results
- c3- Employ primer designing and gene blasting and in nucleic acid (RNA/DNA) purification.
- C4- Practice Molecular detection of fungal, viral and bacterial pathogens using molecular techniques as PCR, to illustrate resistance and virulence genes
- C5- Interpret gel electrophoresis and interpretation of Real time PCR.
- C6- Interpret reports of culture/ sensitivity and PCR.
- C7- Use technology to advance practice

**d) General and Transferable Skills:**

- d1. Communicate through group discussion
- d2. Work as a part of team
- d3. Develop skills in information technology
- d4. Develop skills for oral presentation
- d5. Develop skills in reading and research
- d6. Develop skills to work safely in a laboratory environment

**3- ACADEMIC STANDARDS**

**3a External references for standards (Benchmarks)**

Generic Academic Reference Standards if the National Authority for Quality Assurance and Accreditation of Education (NAQAAE)



**Date of Academic Reference standards (ARS) approval by Institute Council:**

12/2/2014

**3b Comparison of provision to selected external references**

<b>Generic Academic Standards</b>	<b>ARSoMaster ofDiagnostic and Molecular Microbiology</b>
<p>A1. Basic facts, theories, of the specialty and related subjects/ fields</p>	<p>a1. Recall and understand medical microbiology through achieving basic knowledge of the mechanisms of bacterial, viral and fungal pathogenesis from a classical and molecular perspective.</p> <p>a2. Describe Medical Virology and the fundamental basis of the virus life style, the ground rules of viral pathogenesis, covering the different areas: viral structure, replication, viral virulence and l persistence. Studying virus cell interactions and oncogenesis, and finally treatment with antiviral drugs together with methods of prevention and control of viral diseases.</p> <p>a3. Recognize fungal infection focusing particularly on the practical elements of diagnosis and providing graduates with skills for working and participating in a broad-based mycology service.</p> <p>a4. Discuss t fundamentals of bacterial genetics; eukaryotic and prokaryotic genes, nucleic acids, DNA replication, the processes of transcription and translation, gene transfer, gene expression and genetic exchange and mutations.</p> <p>a5. Recognize molecular laboratory techniques used in isolation, identification of microbial pathogens including methods of DNA and RNA extraction from clinical specimen and amplification techniques, focusing on recombinant DNA technology, molecular typing, polymerase chain reaction (PCR), real time fluorescent PCR.</p> <p>a6.Illustrate different isolation methods of nucleic acid extraction and amplification and sequencing</p> <p>a7. Discuss microbial diseases of public health significance, and methods of investigation.</p> <p>a8.List the different signs and symptoms of the microbial diseases of public health significance and investigations applied for them</p> <p>a11.Discuss basic knowledge of host parasite relationship, infectious process, virulence determinants and host defense mechanisms.</p>
<p>A2- Mutual relation between</p>	<p>a8.List the different signs and symptoms of the</p>



<p>professional practice and effects on environment</p>	<p>microbial diseases of public health significance and investigations applied for them.</p> <p>a9. Understand how pathogens may be transmitted and principles to minimize the transmission of disease to patient, visitors, employees of healthcare facilities, and community at large.</p> <p>a10. Recall mode of action of different antimicrobial agents and the mechanism of bacterial resistance to these agents, the susceptibility of the organism to appropriate antimicrobial agents, the influence of technical variation on susceptibility test results and the indications for susceptibility tests in the clinical laboratory</p> <p>a11. Discuss basic knowledge of host parasite relationship, infectious process, virulence determinants and host defense mechanisms.</p> <p>A12. Define the concept of microscopic examination, aseptic techniques for the transfer and handling of microorganisms and different types of clinical samples and the principles of immunologic assays for diagnosis of important infectious diseases</p>
<p>A3- Recent advances in the field of practice.</p>	<p>a13. Discuss current hot topics and important concepts in the field of microbiology</p> <p>a5. Recognize molecular laboratory techniques used in isolation, identification of microbial pathogens including methods of DNA and RNA extraction from clinical specimen and amplification techniques, focusing on recombinant DNA technology, molecular typing, polymerase chain reaction (PCR), real time fluorescent PCR.</p>
<p>A4- Details of ethical &amp; legal practice.</p>	<p>A4- Describe the principles and quality standards of the lab techniques used in diagnostic microbiology and</p>



A5 -Quality standards of the practice.	details of ethical & legal practice and quality standards of the practice.
A6- Design, conduction & publishing of scientific research.	Recognize design, conduction & publishing of scientific research through student assignments and thesis
A7- Ethical considerations in different types of scientific research.	summarize ethical consideration in different types of scientific research through thesis
B1- Analyze, deduce, extrapolate & evaluation of information	<p>b1. Demonstrate an understanding of, the causal relationship of bacterial diseases, symptoms and application of microbiological techniques in the diagnosis of infectious diseases.</p> <p>b2. Categorize viruses according to standard taxonomy, distinguish pathogenesis, clinical symptoms, signs, investigations, treatment and prognosis of the medically important viruses and formulate and evaluate appropriate management plans for different viral infections.</p> <p>b3. Interpret the pathogenic effects of fungi and the use of serological tests in diagnosing fungal infections.</p> <p>b4. Illustrate the fundamentals of bacterial genetics and differentiate between the structures of eukaryotic and prokaryotic genes and different bacterial genetic regulation processes.</p> <p>b5. Compare the different methods of nucleic acid isolation, different methods of gene cloning, conventional &amp; real time PCR</p> <p>b6. Distinguish pathogenesis, clinical symptoms, signs, investigations, treatment and prognosis of the medically important emerging pathogens</p> <p>b10. Assess the concept of aseptic handling of specimens and evaluate different immunologic and serologic tests used in the diagnosis of important infectious diseases.</p> <p>b11. Analyze emerging health problems in the field of microbiology and ways conducted to combat them</p>
B2- Solve the majority of problems in the specialty according to the available data (complete or incomplete)	b8. Evaluate and maintain a safe environment for lab personnel, explain the reason behind contamination or infection problem appeared in the lab, management infection problem depending on the strategies of Infection Control.



	<p>b9.Appraise the different mode of action of antimicrobial agents, select the most appropriate and cost-effective antimicrobial agent leading to control of disease</p> <p>b.10. Illustrate the concept of aseptic handling of specimens and evaluate different immunologic and serologic tests used in the diagnosis of important infectious diseases</p>
B3- Conduct research studies that add to the existing specialty knowledge	Conduct research studies that add to the existing specialty knowledge through thesis.
B4- Publish scientific articles/papers (in indexed journals)	Publish scientific articles/papers (in indexed journals) through thesis
B5- Plan and implement (or supervise implementation of) enhancement & Improvement approaches to practice	Apply and manage their own learning, including time management skills and the ability to learn effectively from a range of resources, including lectures, textbooks, websites and the scientific literature
B6- Take decisions in various professional situations (including dilemmas & controversial issues)	<p>b6.Distinguish pathogenesis, clinical symptoms, signs, investigations, treatment and prognosis of the medically important emerging pathogens</p> <p>b7.Illustrate the microbial diseases of public health significance in the field of microbiology and ways conducted to combat them.</p> <p>b11.Illustrate emerging health problems in the field of microbiology and ways conducted to combat them</p>
B7- Add to the specialty field through	Add to the specialty field through creativity and innovation through thesis
B8- Manage discussions on basis of evidence and proofs	<p>b5.Compare the different methods of nucleic acid isolation, different methods of gene cloning , conventional &amp; real time PCR</p> <p>b9.Appraise the different mode of action of antimicrobial agents, select the most appropriate and cost-effective antimicrobial agent leading to control of disease</p>
C1- Competent in all basic and all required advanced professional skills ( to be determined according to the specialty board/ department)	<p><b>c1-</b> Acquire skills to work in safe environments and following infection control measures</p> <p><b>c2</b>Acquire skills to isolate and identify pathogens by biochemical , serological diagnosis methods (microscope, ELISA) with ability to interpret test results</p> <p>c3- Gain skills in primer designing and gene blasting and in nucleic acid (RNA/DNA) purification</p> <p><b>C4-</b> Gain skills in Molecular detection of fungal, viral and bacterial pathogens using molecular techniques as PCR, to illustrate resistance and virulence genes</p>





	<b>C5</b> -Gain skills in interpretation of gel electrophoresis and interpretation of Real time PCR
<b>C2</b> - Write and appraise reports	<b>C6</b> - Write and review reports of culture/ sensitivity and PCR
<b>C3</b> - Evaluate and improve methods and tools used in specialty	Evaluate and improve methods and tools used in specialty through student questionnaire
<b>C4</b> - Use technology to advance practice	<b>C7</b> . Use technology to advance practice
<b>C5</b> - Plan professional development courses to improve practice and enhance performance of juniors	Plan professional development courses to improve practice and enhance performance of juniors through student questionnaire
<b>D1</b> - Communicate effectively using all Methods	d.1. Communicate through group discussion d.2. Work as a part of team
<b>D2</b> - Use information technology to improve his/her professional practice	d.3. Develop skills in information technology d.4. Develop skills for oral presentation d.5. Develop skills in reading and research
<b>D3</b> - Teach and evaluate others	d.4. Develop skills for oral presentation d.5. Develop skills in reading and research d.6. Develop skills to work safely in a laboratory environment
<b>D4</b> - Perform self-appraisal & seek continuous Learning	d.3. Develop skills in information technology d.5. Develop skills in reading and research
<b>D5</b> - Use different sources of information to obtain data	d.3. Develop skills in information technology d.5. Develop skills in reading and research
<b>D6</b> - Work in teams as well as a member in larger teams	d.2. Work as a part of team
<b>D7</b> - Manage scientific meetings and appropriately utilize time	d.3. Develop skills in information technology d.4. Develop skills for oral presentation d.5. Develop skills in reading and research



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## 4- Curriculum Structure and content:

4.a. Program duration: 4-5 Years

4.b. Program Structure:

## 4.b.i. Number of hours per week in each year/semester

Semester	Core Courses	Elective Courses
	No. of hours	No. of hours
First semester	Microbiology of anti- microbial agents (2 CH) Microbial pathogenesis (1 CH) Microbial genetics (1 CH) Immunology (2 CH) <b>TOTAL (6 CH)</b>	
Second semester	Medical bacteriology (4 CH) Microbiology lab techniques I, (2 CH) Medical Statistics (2 CH) <b>TOTAL (8 CH)</b>	Clinical epidemiology (2 CH) Infectious diseases (2 CH)
Third semester	Medical Virology (4 CH) Special topics in microbiology I (1 CH) <b>TOTAL (5 CH)</b>	
Fourth semester	Biosafety and infection control (1 CH) Medical Mycology (2 CH) <b>TOTAL (3 CH)</b>	
Fifth semester	Molecular diagnostic microbiology I (3 CH) Molecular lab techniques I (1 CH) <b>TOTAL (4 CH)</b>	

## 4.b.ii. Number of Credit hours:

Lectures	(23)	Practical	(7)	Total	(30)
Compulsory	(26)	Elective	(4)	Optional	(0)

4.b.iii- No. of credit hours of basic science courses	No.	<input type="text" value="4"/>	%	<input type="text" value="13.3"/>
4.b.iv- No. of credit hours of courses of social sciences and humanities.	No.	<input type="text" value="0"/>	%	<input type="text" value="0"/>
4.b.v- No. of credit hours of specialized courses	No.	<input type="text" value="24"/>	%	<input type="text" value="80"/>
4.b.vi- No. of credit hours of other courses (e.g. statistics, computer)	No.	<input type="text" value="2"/>	%	<input type="text" value="6.7"/>
4.b.vii- Field Training	No.	<input type="text" value="0"/>	%	<input type="text" value="0"/>



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**4.b.viii- Program levels (in credit-hours system)**

Student is required to pass at least 12 credit hours with CGPA not less than C+ before submitting a thesis proposal.

**5-PROGRAM COURSES****5.1 Compulsory courses**

Code No	Course Title	No of Credit Hours	No of hours/week	
			Lectures	Practical
1706701	Medical Bacteriology	4	4	-
1706702	Medical Virology	4	4	-
1706703	Medical Mycology	2	1	2
1706704	Microbial genetics	1	1	-
1706705	Molecular diagnostic microbiology I	3	2	2
1706706	Molecular lab techniques I	1	-	2
1706707	Special topics in microbiology I	1	1	-
1706709	Biosafety and infection control	1	1	-
1706710	Microbiology of anti-microbial agents	2	2	-
1706711	Microbial pathogenesis	1	1	-
1706712	Microbiology lab techniques I	2	1	2
1708720	Immunology	2	1	2
1721720	Medical Statistics	2	1	2



**5.2 Elective Courses I**

Code No	Course Title	No of Credit Hours	No of hours/week	
			Lectures	Practical
1706708	Infectious diseases	2	2	-
1706713	Mycology	4	4	-
1701720	Biochemistry	2	1	2
1704720	Pharmacology	2	1	2
1707720	Parasitology	2	1	2
1710720	Pathology	2	1	2
1700780	Clinical EpidemiologyI	2	2	-
1709740	Basics in lab animal science	2	1	2
1717720	Chemical Pathology	2	1	2

**5.3 Elective Courses II**

(None)

**5.4. Optional:**

(None)

**6- PROGRAM ADMISSION REQUIREMENTS**

Graduate Students with a M.B.Ch.B. of Medicine, B.Sc. of Pharmacy, Dentistry, Veterinary, or Science

**7- REGULATIONS FOR PROGRESSION AND PROGRAM COMPLETION**

- 1- For the progression and completion of the program to obtain the degree of Master of Science in Diagnostic and Molecular Microbiology, the student must complete (38) credit hours with CGPA of at least C+
- 2- Submit a thesis validity report by an examination committee approved by the department council and their members include at least two external examiners

**8- EVALUATION OF PROGRAM INTENDED LEARNING OUTCOMES**

Tool evaluation	Intended learning outcomes being assessed
Written	ILOs a & b



Practical	ILOs c
Oral	ILOs a ,b &d
Semester Work	ILOs b & d

**Evaluation of the Program**

<b>Evaluator</b>	<b>Tool</b>	<b>Sample</b>
1- Senior students	Interview	At least 50 %
2- Alumni	Interview	Representative sample
3- Stakeholders (Employers)	Interview	Representative sample
4- External Evaluator(S) or External Examiner (s)	Reports	Name of evaluator or examiner
5- Other		

**Dates of Previous editions/revisions:**

<b>Editions/Revisions Number</b>	<b>Date</b>
Edition no.1	2009
Edition no. 2	2011
Edition no.3	5/6/2014
Edition no.3, revision no.1	12/2014
Edition no.3, revision no.2	10/2016
Edition no.3, revision no. 3	9/2017

**Program Coordinator:** Prof.Dr.Abeer Ghazal **Signature**

**Head of Department:** Prof.Dr.Abeer Ghazal **Signature**

**Date of Department Council  
Approval: 6/09/2017**



Department of Microbiology

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Program Aims vs ILOs matrix

	A 1	A 2	A 3	A 4	A 5	A 6	A 7	A 8	A 9	A 10	A 11	A 12	A 13	B 1	B 2	B 3	B 4	B 5	B 6	B 7	B 8	B 9	B 10	B 11	C 1	C 2	C 3	C 4	C 5	C 6	C 7	D 1	D 2	D 3	D 4	D 5	D 6		
1- Acquire and integrate a knowledge base in all areas of microbiology to enable students to understand the pathogenic processes.	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x				x	x				x	x								x	x	x	x	x	
2- Have comprehensive knowledge on fundamentals of medical bacteriology and its relation to human biology and disease through studying the basic properties of	x			x			x		x	x	x	x	x	x						x	x				x								x	x	x	x	x		



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microorganisms.																																																								
3- Understand the fundamental basis of the virus life style and the ground rules of viral pathogenesis.	x					x	x	x		x	x	x		x																												x	x	x	x	x										
4- Have a basic knowledge on the fundamentals of medical mycology as regarding morphology, taxonomy classification of fungi, detection from clinical specimen.		x					x	x		x	x	x		x																																x	x	x	x	x						
5- Understand fundamentals of bacterial genetics and the basic	x		x																																																	x	x	x	x	x



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<p>knowledge of eukaryotic and prokaryotic genes, nucleic acids, DNA replication, transcription and translation, mechanisms of gene transfer, gene expression and mechanisms of genetic exchange and mutations.</p>																																										
<p>6- Have comprehensive knowledge on molecular laboratory techniques used in isolation, identification of microbial</p>				x																																		x	x	x	x	x







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<p>preparation, different amplification protocols with both conventional polymerase chain reaction and real time polymerase chain reaction.</p>																													
<p>8- Have comprehensive knowledge on general considerations for the epidemiology of the infectious agents; the clinically important viral, bacterial and fungal diseases both in community and</p>	x	x	x			x	x		x	x			x	x	x		x	x							x	x	x	x	x





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antimicrobial agents , the susceptibility of organisms and resistance mechanisms to these antimicrobials. The indications for susceptibility tests and technical variations of susceptibility tests applied in clinical laboratories																																											
11- Have a comprehensive knowledge about normal flora, host parasite relationship, infectious process, virulence determinants and host defense	x	x	x						x	x																													x	x	x	x	x





Courses vs Program ILOs matrix

Course Title	a 1	a 2	a 3	a 4	a 5	a 6	a 7	a 8	a 9	a 10	a 11	a 12	A 13	b 1	b 2	b 3	b 4	b 5	b 6	b 7	b 8	b 9	b 10	b 11	c 1	c 2	c 3	c 4	C 5	C 6	C 7	d 1	d 2	d 3	d 4	d 5	d 6		
Medical Bacteriology	X						X	X	X	X				X					x	X	X												X	X	X	X	X		
Medical Virology		X					X	X	X						X				x	X													X	X	X	X	X		
Medical Mycology			X				X	X	x							X		X	x						X	x							X	X	X	X	X	X	X
Microbial genetics				X												X																	X	X	X	X	X		
Molecular diagnostic microbiology I					X	x											X									X							X	X	X	X	X		
Molecular lab techniques I					x	x												x							x	X	x	x	x	x	x	X	X	X	X	X	X	X	
Special topics in microbiology I							X						x						X	X				X								X	X	X	X	X			
Biosafety and infection control								X														X											X	X	X	X	X		
Microbiology of anti-microbial agents									X	X				X									X										X	X	X	X	X		



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Microbial pathogenesis						X	x	x	x	X	x			X					X												X	X	X	X	X	
Microbiology lab techniques I										X		x		X						X	X	x	x				x	x		X	X	X	X	X	X	X
Immunology																				x											X	X	X	X	X	
Medical Statistics																															X	X	X	X	X	



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MATRIX ARS VS ILOS (Master degree of Molecular and Diagnostic Microbiology)

	A 1	A 2	A 3	A 4	A 5	A 6	A 7	A 8	A 9	A 10	A 11	A 12	A 13	B 1	B 2	B 3	B 4	B 5	B 6	B 7	B 8	B 9	B 10	B 11	C 1	C 2	C 3	C 4	C 5	C 6	C 7	D 1	D 2	D 3	D 4	D 5	D 6		
<b>A1. Basic facts, theories, of the specialty and related subjects/ fields</b> a1. Recall and understand medical microbiology through achieving basic knowledge of the mechanisms of bacterial, viral and fungal pathogenesis from a classical and molecular perspective. a2. Describe Medical Virology and the fundamental basis of the virus life style, the ground rules of viral pathogenesis, covering the different areas: viral structure,	X	X	X		X			X	X				X																										







processes of transcription and translation, gene transfer, gene expression and genetic exchange and mutations.  a5. Recognize molecular laboratory techniques used in isolation, identification of microbial pathogens including methods of DNA and RNA extraction from clinical specimen and amplification techniques, focusing on recombinant DNA technology, molecular typing, polymerase chain reaction (PCR), real time fluorescent PCR.  a6. Illustrate																																							
										X																													



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different isolation methods of nucleic acid extraction and amplification and sequencing	X	X	x																								
a7. Discuss microbial diseases of public health significance, and methods of investigation.					X																						
a8.List the different signs and symptoms of the microbial diseases of public health significance and investigations applied for them	X	X	X			X		X		X																	
a11.Discuss basic knowledge of host parasite relationship, infectious process, virulence determinants and host defense mechanisms.	x	X	X			X				X																	



<p><b>2- A2- Mutual relation between professional practice and effects on environment</b></p> <p>18. List the different signs and symptoms of the microbial diseases of public health significance and investigations applied for them.</p>	X	X	X					X																											



a9. Understand how pathogens may be transmitted and principles to minimize the transmission of disease to patient, visitors, employees of healthcare facilities, and community.	X	X	X					X	X																										
a10. Recall mode of action of different antimicrobial agents and the mechanism of bacterial resistance to these agents, the susceptibility of the organism to appropriate antimicrobial agents, the influence of	X	X	X					X	X																										











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<p>principles and quality standards of the lab techniques used in diagnostic microbiology and details of ethical &amp; legal practice and quality standards of the practice.</p>				X																											
<p><b>A6- Design, conduction &amp; publishing of scientific research.</b>  Recognize design, conduction &amp; publishing of scientific research through student assignments and thesis.</p>																															
<p><b>A7- Ethical considerations in different types of scientific</b></p>																															



<p><b>research.</b></p> <p>summarize ethical consideration in different types of scientific research through thesis</p>																																					
<p><b>B1- Analyze, deduce, extrapolate &amp; evaluation of information</b></p> <p>b1.Demonstrate an understanding of, the causal relationship of bacterial diseases, symptoms and application of microbiological techniques in the diagnosis of infectious diseases.</p> <p>b2.Categorize viruses according to standard taxonomy ,distinguish</p>																																					



<p>pathogenesis ,clinical symptoms ,signs, investigations, treatment and prognosis of the medically important viruses and formulate and evaluate appropriate management plans for different viral infections.</p> <p>b3. Interpret the pathogenic effects of fungi and the use of serological tests in diagnosing fungal infections.</p> <p>b4. Illustrate the fundamentals of bacterial genetics and differentiate between the</p>																																																				
																			X																																	





pathogens																																																	
<p>b12. Assess the concept of aseptic handling of specimens and evaluate different immunologic and serologic tests used in the diagnosis of important infectious diseases.</p> <p>b13. Analyze emerging health problems in the field of microbiology and ways conducted to combat them</p>																																																	
<p><b>B2- Solve the majority of problems in the specialty according to the available data (complete or</b></p>																																																	













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<p>b5. Compare the different methods of nucleic acid isolation, different methods of gene cloning, conventional &amp; real time PCR</p> <p>b9. Appraise the different mode of action of antimicrobial agents, select the most appropriate and cost-effective antimicrobial agent leading to control of disease</p>																											
<p><b>C1- Competent in all basic and all required advanced professional skills ( to be determined according to the specialty board/ department)</b></p> <p>c1- Acquire skills to</p>																											







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<p><b>C5- Plan professional development courses to improve practice and enhance performance of juniors</b> Plan professional development courses to improve practice and enhance performance of juniors through student questionnaire</p>																														
<p><b>D1- Communicate effectively using all Methods</b> d.1. Communicate through group discussion d.2. Work as a part of team</p>																				X										
<p><b>D2- Use information technology to improve his/her professional practice</b></p>																														











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### Teaching and Learning Methods Vs Courses Matrix

	<b>Medical Bacteriology 1706701</b>	<b>Medical Virology 1706702</b>	<b>Medical Mycology 1706703</b>	<b>Microbial Genetics 1706704</b>	<b>Molecular diagnostic microbiology I 1706705</b>	<b>Molecular lab techniques I 170606</b>	<b>Special topics in microbiology I 1706707</b>	<b>Infectious diseases 170608</b>	<b>Biosafety and infection control 1706709</b>	<b>Microbiology of anti-microbial agents 1706710</b>
<b>Lecture</b>	*	*	*	*	*		*	*	*	*
<b>Seminars/Tutorial</b>	*	*	*	*	*	*	*	*	*	
<b>Practical</b>			*		*	*				
<b>Brainstorming</b>										
<b>Discussion Groups</b>	*	*	*	*	*		*			*
<b>Assignments</b>		*	*	*	*	*	*	*	*	*
<b>Problem Solving</b>				*	*	*				
<b>Case Study</b>										
<b>Field Training</b>										
<b>Role playing</b>										
<b>Training Workshops</b>				*		*				
<b>Self-Directed Learning</b>	*	*								*
<b>e-learning</b>										
<b>Project</b>								*		



	<b>Microbial pathogenesis 1706711</b>	<b>Microbiology lab techniques I 1706712</b>	<b>Clinical Epidemiology I 1700780</b>
Lecture	*	*	*
Seminars/ Tutorial	*	*	*
Practical/Clinical		*	
Brainstorming			
Discussion Groups	*	*	*
Assignments	*	*	*
Problem Solving		*	
Case Study			
Field Training			
Role playing			
Training Workshops			
Self-Directed Learning			
e-learning			
Project			



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